THERMAL INTEGRATION OF PRESSURIZED FUEL CELL SYSTEMS WITH EXPANDER

ABSTRACT OF THE DISCLOSURE

A fuel cell system having a fuel cell with an anode chamber separated from a cathode chamber by a proton exchange membrane. The cathode chamber receives a compressed oxygen-containing gas and discharges it to a cathode exhaust gas line. The cathode exhaust gas is cooled to remove excess moisture. The cathode exhaust gas line then flows through a heat exchanger that is coupled to the fuel cell for receiving waste heat of the fuel cell and transferring it to the cathode exhaust gas. The heated cathode exhaust gas then flows to an expansion turbine, where additional fuel cell waste heat is transferred to the exhaust gas. The greater work performed by the higher energy exhaust gas passing through the expansion turbine increases the overall efficiency of the fuel cell system.